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The End in Sight: Poly(A), Translation and mRNA Stability in Eukaryotes

Thomas Preiss

All nuclear-encoded eukaryotic messenger RNAs possess a 5' cap structure (m⁷GpppN) and, with a few exceptions, also possess a 3' poly(A) tail. These modifications are added as part of the mRNA processing pathway during or immediately after transcription in the nucleus. Subsequently, they both influence different aspects of mRNA metabolism including splicing, transport, stability and translation. The cap structure has an important role during the initiation phase of translation as it recruits ribosomes and associated factors to the mRNA. The poly(A) tail can also stimulate translation and cooperates with the cap structure in a synergistic fashion. The eukaryotic initiation factor eIF4G plays a central part as a multifunctional adapter, which brings together various components of the translation apparatus. Through simultaneous interactions with the cap-binding protein eIF4E and the poly(A)-binding protein (PABP), eIF4G is able to bridge the two ends of the mRNA. The resulting pseudo-circular structure of the mRNA is thought to have important functional consequences for the translation process. The importance of the poly(A) tail is further underscored by the fact that the regulated variation of its length on maternal mRNAs is an integral part of gene regulation during oocyte maturation and in early embryonic development. Finally, the majority of cellular mRNAs are degraded by processes that are interconnected with translation and are initiated by poly(A) tail shortening. [↑ TOP](#)

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